C0 IR Lattice Change

Peter H. Garbincius (BTeV-doc-3348)

presented for
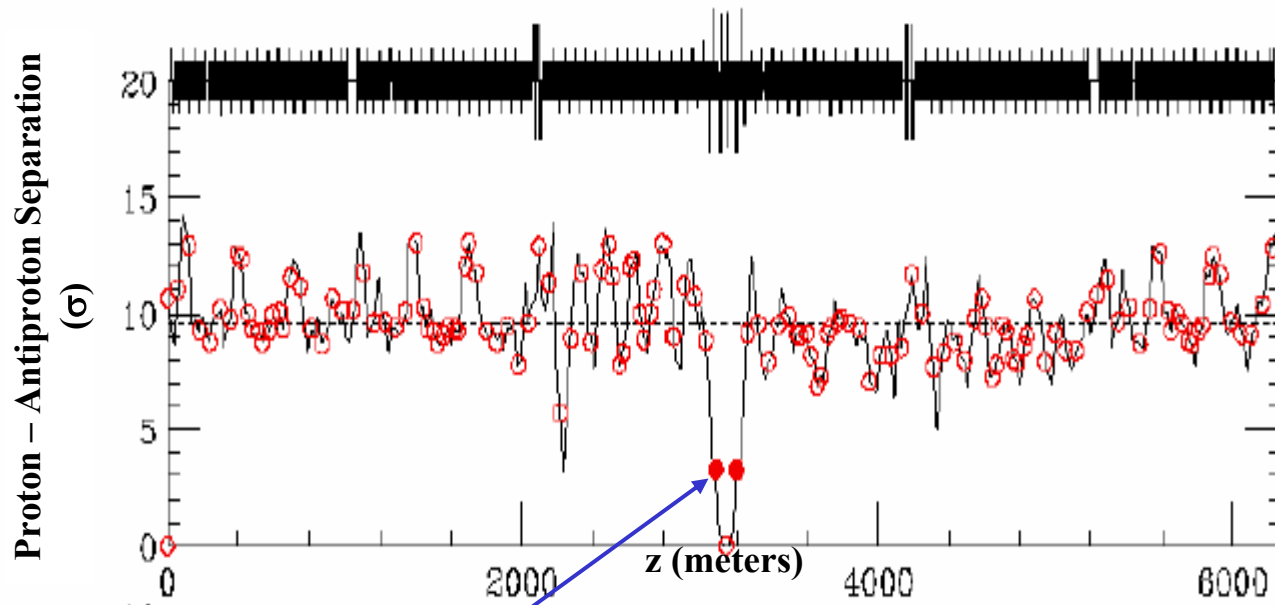
Mike Church (BTeV-doc-3306)

Fermilab

Outline

- **Motivation for change**

- **How the change is implemented**

- **Beam dynamics impact**

- **Cost/schedule impact**

- **Process and documentation**

Original BTeV Low Beta Lattice – around entire ring

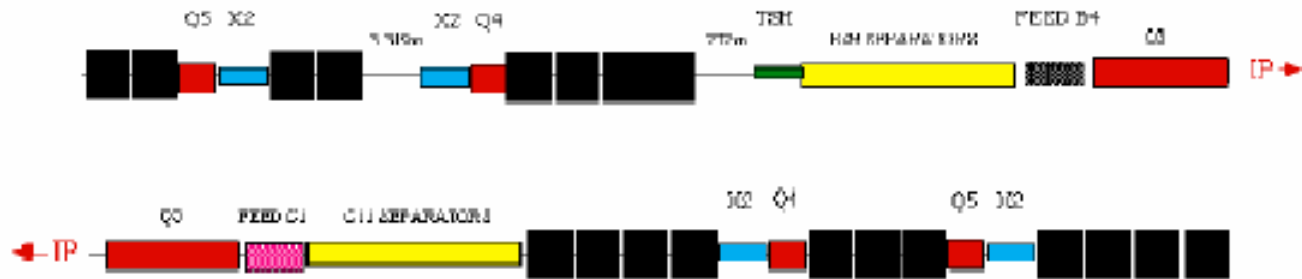**Increase separation of nearest parasitic crossings from 3.3 σ to 6.5 σ**

for illustration only – not to scale

Opus 1 :

Q4/X2 swapped and moved farther from I.P.

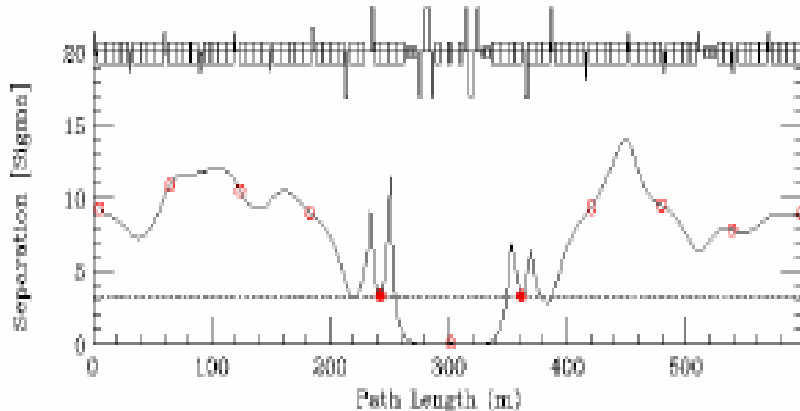**now only need one type X2 spool instead of X2right and X2left**
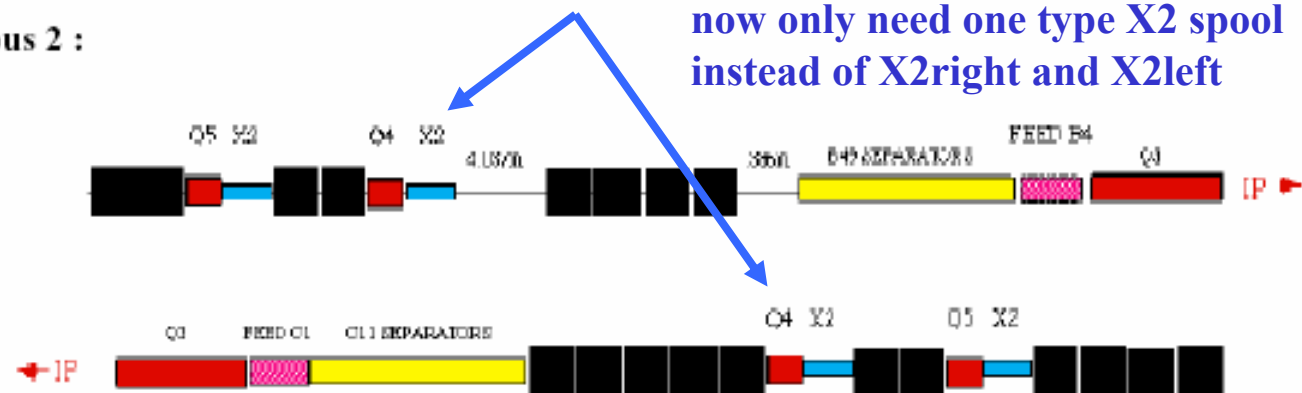
Opus 2 :

first few parasitic crossings near C0 I.P.

Opus 1

minimum separation = 3.3 σ

Opus 2

minimum separation = 6.5 σ

Beam Dynamics (coupling)
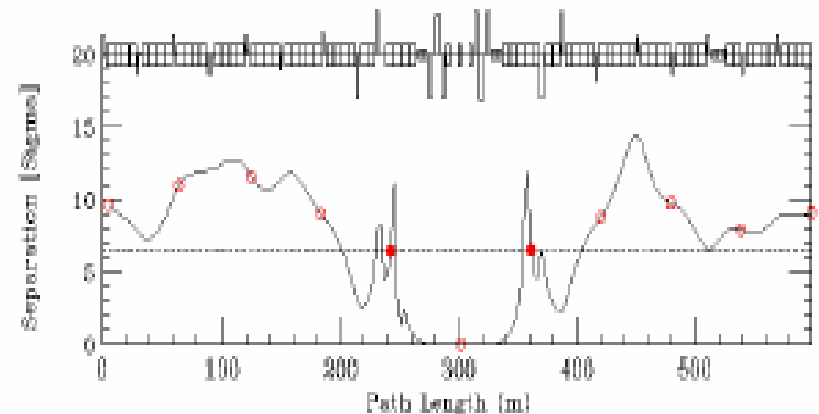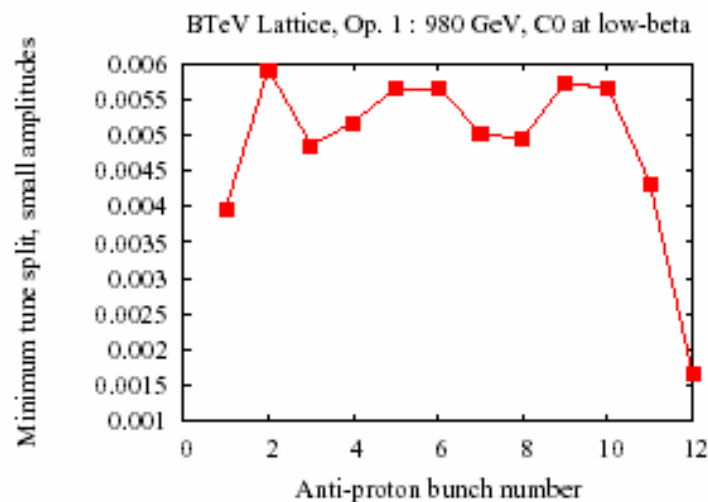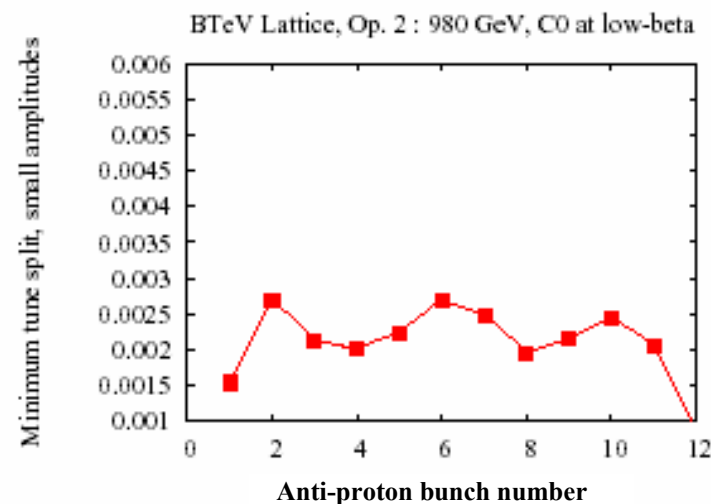
Opus 1

Opus 2

- **tune split = Qx - Qy**
- **More uniform tune split is good**
- **Smaller tune split is good**
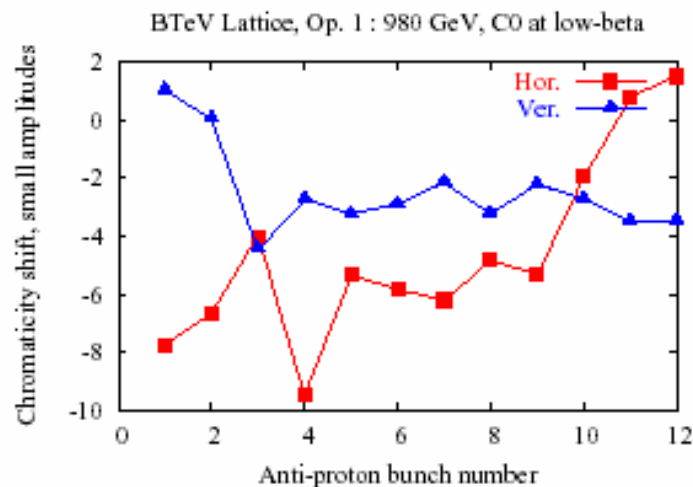
BTeV
C0

Opus 1
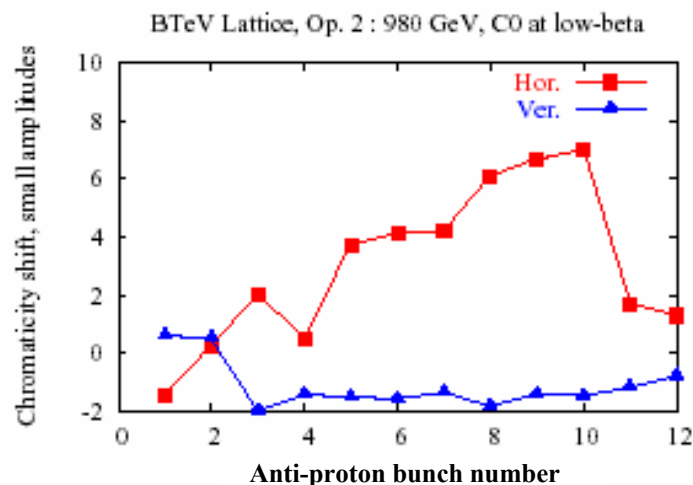
Opus 2

- **More uniform chromaticity shift is good**
- **Smaller chromaticity shift is good**
- **Positive chromaticity shift is good**

Tune footprints: BTeV Lattice, 980 GeV
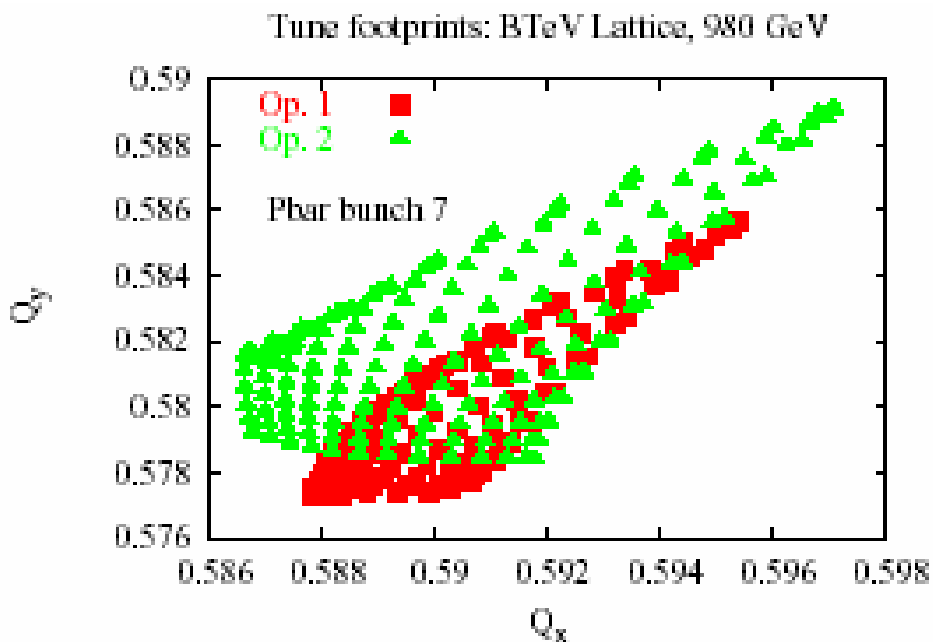
- **Tune spread is larger for Opus 2, but still 2x smaller than Run II**
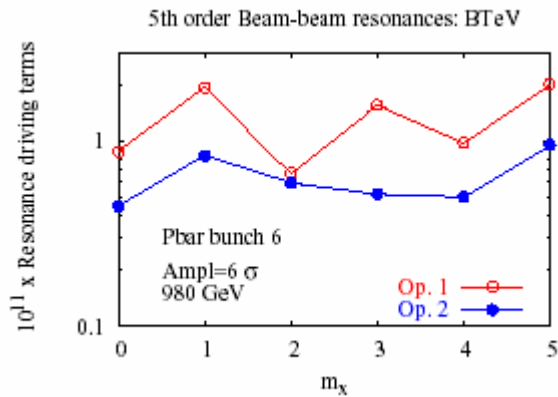
5th order

7th order
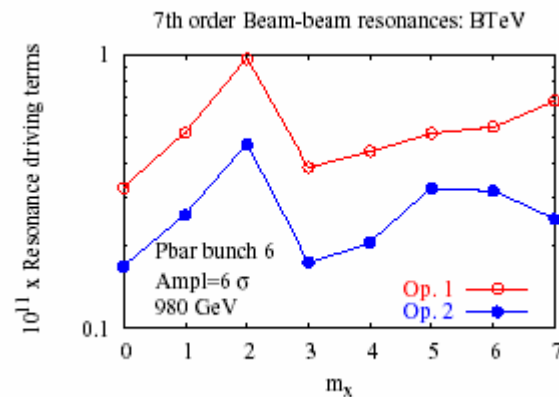
12th order
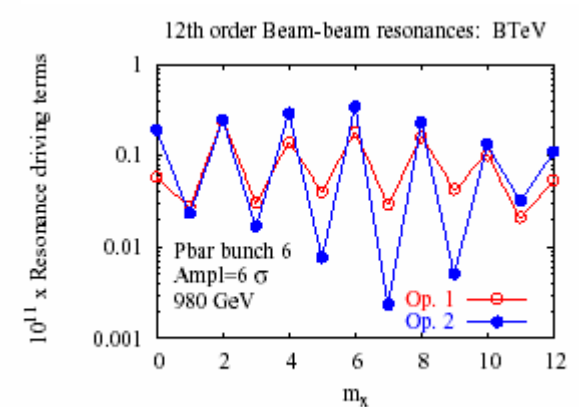
$$m_x\nu_x + (n - m_x)\nu_y = p \qquad \text{where } n = \text{resonance \#, } p = \text{integer, } \nu = \text{tune}$$

OPUS 1 item	cost (K$)	funding source	OPUS 2 item	cost (K$)	funding source
HTS fabrication (1pair)	127	IR_Spares	HTS fabrication	0	IR_Spares
HTS testing (1 pair)	23	IR_Spares	HTS testing	0	IR_Spares
corrector package (2 packages)	88	IR_Spares	corrector package	0	IR_Spares
spool assembly (1 spool)	327	IR_Spares	spool assembly	0	IR_Spares
spool testing (1 spool)	32	IR_Spares	spool testing	0	IR_Spares
magnet sum	**597**		**magnet sum**	**0**	**-597**
C11/B49 bypass design	17	Construction	C11 bypass design	17	Construction
C11 bypass fab.	97	Construction	C11 bypass fab.	97	Construction
B49 bypass fab.	97	Construction	C11 bypass spare fab.	97	IR_Spares
B49/C11 bypass spare fab.	97	IR_Spares	B49 bypass design	17	Construction
C11 TAB w/leads design	141	Construction	B49 bypass fab.	97	Construction
C11 TAB w/leads fab.	157	Construction	B49 bypass spare fab.	97	IR_Spares
C11 TAB w/leads spare fab.	157	IR_Spares	C11/B49 TAB w/leads design	141	Construction
HTS leads for C11 TAB	54	Construction	C11 TAB w/leads fab.	157	Construction
HTS leads for C11 TAB spare	54	IR_Spares	B49 TAB w/leads fab.	157	Construction
B49 spacer design	17	Construction	C11/B49 TAB w/leads spare fab.	157	IR_Spares
B49 spacer fab.	24	Construction	HTS leads for C11/B49 TAB	108	Construction
B49 spacer spare fab.	24	IR_Spares	HTS leads for C11/B49 TAB spare	54	IR_Spares
H-spool installation	3	Construction			
B49 spacer installation	3	Construction			
B49 TAB wo/leads design	67	Construction			
B49 TAB wo/leads fab.	129	Construction			
B49 TAB wo/leads spare fab.	129	IR_Spares			
cryo components sum	**1267**		**cryo components sum**	**1196**	**-71**
total sum	**1864**		**total sum**	**1196**	**-668**

Save 1 month on spare spool assembly; ~1 month on cryo elements; neither are critical path

Change Control Process

- **Proposal presented to C0 IR team by J Johnstone at internal meeting (June)**
  - **Approved internally after discussion of technical issues**
- **Formal review by V. Shiltsev, D. Edwards, M. Syphers (July)**
  - **Committee recommendation: adopt the change**
- **Presented to and approved by BTeV Technical Board (August 5, 2004)**
- **PCR (Project Change Request) and**

  TCSSA (Technical Cost Schedule Safety Analysis) forms submitted
- **Waiting for formal approval from Directorate**

- **Beam dynamics documented in btev-doc-3230 (J Johnstone, T Sen)**
- **Process and cost documented in btev-doc-3276**
- **Open Plan already updated for Opus 2**
- **Design Report still needs to be updated**